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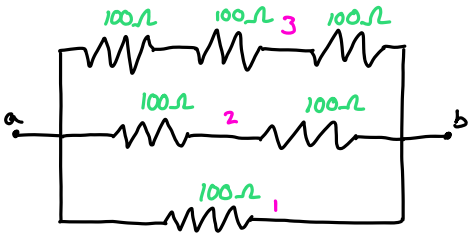
Dr. Middleton PHYS 132 HW
3-8-17

Ch. 31
CQ: 11
P: 24, 59, 60

Problems

31.P.24



R_3: $R_{eq} = R_{1a} + R_{1b} + R_{1c}$
$R = 300\Omega$

R_2: $R_{eq} = R_{2a} + R_{2b}$
$R = 200\Omega$

R_1: $R = 100\Omega$

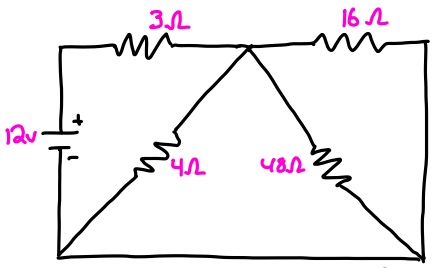
$R_{eq} = 54.5\Omega$

$R_1 + R_2 + R_3$: $\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$ $\quad R_{eq} = 54.5\Omega$

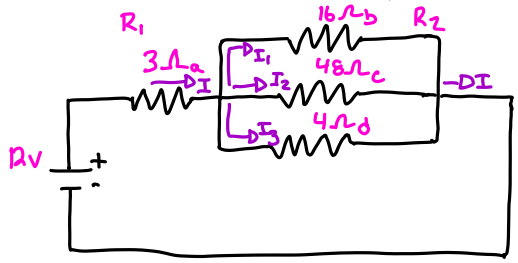
$\frac{1}{R_{eq}} = \frac{1}{100\Omega} + \frac{1}{200\Omega} + \frac{1}{300\Omega}$

$\frac{1}{R_{eq}} = \frac{11}{600\Omega}$

31.P.59



I through each resistor?
ΔV through each resistor?



$R_1 + R_2 = 3\Omega + 3\Omega = 6\Omega$
$R_{eq} = 6\Omega$

$\frac{1}{R_2} = \frac{1}{16\Omega} + \frac{1}{48\Omega} + \frac{1}{4\Omega}$

$R_2 = 3\Omega$
$R_2 \approx 3\Omega$

Resistor	I	ΔV
3Ω = A	$I_A = 2A$	$\Delta V_A = 6V$
16Ω = B	$I_B = 0.375A$	$\Delta V_B = 6V$
48Ω = C	$I_C = 0.125A$	$\Delta V_C = 6V$
4Ω = D	$I_D = 1.5A$	$\Delta V_D = 6V$

$I = \frac{\Delta V}{R} = \frac{12V}{6\Omega}$

$I = 2A$

1: $I = \frac{\Delta V}{R}$
$\Delta V = IR = 2A(3\Omega)$
$\Delta V = 6V$

$-I_1(16\Omega) - I_2(48\Omega) - I_3(4\Omega) + 6V = 0$

2: wired in parallel ∴ ΔV same for all

$\Delta V_B = 6V$
$\Delta V_C = 6V$
$\Delta V_D = 6V$

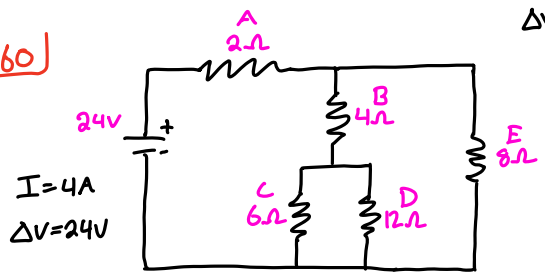
A: $\Delta V = I_A R_A$
$\Delta V = 6V$
$I_A = 2A$
$\Delta V_A = 6V$

B: $I = \frac{\Delta V}{R_B} = \frac{6V}{16\Omega}$
$I_B = 0.375A$
$\Delta V_B = 6V$

C: $I = \frac{\Delta V}{R_C} = \frac{6V}{48\Omega}$
$I_C = 0.125A$
$\Delta V_C = 6V$

D: $I = \frac{\Delta V}{R_D} = \frac{6V}{4\Omega}$
$I_D = 1.5A$
$\Delta V_D = 6V$

31.P.60



$I = 4A$
$\Delta V = 24V$

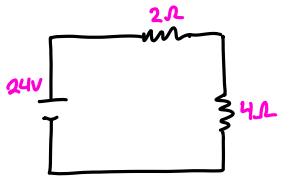
C+D: $\frac{1}{R_{CD}} = \left(\frac{1}{6\Omega} + \frac{1}{12\Omega}\right)$

$R_{CD} = 4\Omega$

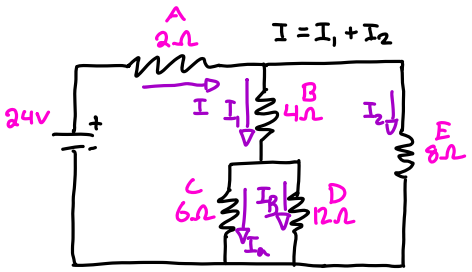
$R_{CD} + R_B$: $R_{BCD} = 4\Omega + 4\Omega$
$R_{BCD} = 8\Omega$

$R_{BCD} + R_E$: $\frac{1}{R_{BCDE}} = \left(\frac{1}{8\Omega} + \frac{1}{8\Omega}\right)$

$R_{BCDE} = 4\Omega \equiv R_{EQ} = 4\Omega$



$24V - I(2\Omega) - I(4\Omega) = 0$
$I(6\Omega) = 24V$
$I = 4A$



$24V - I(2\Omega) - I_1(4\Omega) - I_1(4\Omega) = 0$

$-I(2\Omega) - 2I_1(4\Omega) = -24V$

$I = 2A + I_2$

$I_2 = 2A$

$2I_1(4\Omega) = 16V$

$8\Omega I_1 = 16V$

$I_1 = 2A$

A: $\Delta V = IR$

$\Delta V = 4A(2\Omega)$

$\Delta V_A = 8V$

$I_A = 4A$

B: $\Delta V = IR$

$\Delta V = 2A(4\Omega)$

$\Delta V_A = 8V$

$I_A = 2A$

C: $\Delta V = IR$

$\Delta V_C = 8V$

$8V = I(6\Omega)$

$I_C = 1.33A$

D: $\Delta V = IR$

$\Delta V_D = 8V$

$8V = I(12\Omega)$

$I_D = 0.67A$

E: $\Delta V = IR$

$\Delta V = 2A(8\Omega)$

$\Delta V_E = 16V$

$I_E = 2A$

R	ΔV	I
A	8V	4A
B	8V	2A
C	8V	1.33A
D	8V	0.67A
E	16V	2A

Conceptual

31.C.11 The potential difference between points 1 & 2 will become 0 since there will be no connection between the two after it is disconnected